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10/661,752	09/12/2003	Darwin Mitchel Hanks	200313596-1	8149

22879 7590 09/26/2006		EXAMINER
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2627	

INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

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Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/661,752	HANKS, DARWIN MITCHEL
	Examiner	Art Unit	
	Christopher R. Lamb	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>07 August 2006</u>.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-44</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-44</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Specification

1.   The title of the invention is not descriptive. A new title is required that is clearly

indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

3.   Claims 6-8, 19-21, 30, 33, and 40-42 rejected under 35 U.S.C. 112, second

paragraph, as being indefinite for failing to particularly point out and distinctly claim the

subject matter which applicant regards as the invention.

This rejection has been repeated from the previous Office Action:

Regarding claim 6, terms A0, A1, A2, B1, B2, DC0, QS1, QS2, QC1, and QC2

are not defined.

Regarding claims 7 and 8, function Wk is not defined: it may be that it is itself the

signal generated by the actuator control signal generator, in which case it would be

defined, but the phrase "according to" seems to imply that it is instead a separate

function that influences the generating of the actual signal.

Regarding claims 19-21, 30, 33, and 40-42, they are similar to claims 6-8.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1, 4, 5, 10, 11, 14, 17, 18, 22, 23, 25, 28, 29, 31, 35, 38, 39, and 43 are

rejected under 35 U.S.C. 102(b) as being anticipated by Hajjar et al. (US 5,742,573).

These rejections have been repeated from the previous Office Action:

Regarding claim 1, Hajjar discloses a system for providing a signal to an actuator

within an optical disk drive, to focus optics on an optical disk within the optical disk drive

(abstract), wherein the system comprises:

an error term generator configured to generate an error term (column 5, lines 1-

11, where the details are similar to column 4, lines 15-18);

an adaptation coefficient configured to regulate a rate at which the error term

modifies an actuator control signal (column 5, lines 1-11, where the details are similar to

column 4, lines 53-57: if the feedforward signal is averaged with previous iterations

there must be a coefficient configured to regulate the rate at which the error term

modifies it); and

an actuator control signal generator to generate the actuator control signal,

wherein the actuator control signal is a function of a prior actuator position, the error

term and the adaptation coefficient (column 5, lines 1-11, where the details are similar

to column 4, lines 46-57).

Regarding claim 4, in Hajjar the error term generator is configured to calculate

the error term for every new actuator control signal generated by the actuator control

signal generator (Hajjar's apparatus always calculates uses the error term to generate

the control signal).

Regarding claim 5, in Hajjar the actuator control signal generator additionally

comprises:

a coefficient generator to generate coefficients as a function of inputs comprising

the adaptation coefficient and the error term (column 4, lines 37-57); and

a Fourier subroutine to generate the actuator control signal using the coefficients

generated (column 45, lines 37-57).

Regarding claim 10, the system of Hajjar is a baseline actuator positioning

routine to set a baseline voltage level (the end product is a signal – a baseline voltage

level – that is applied to the focus servo during focusing operation).

Regarding claim 11, in Hajjar the baseline voltage level includes an AC

component (it alternates based on the surface height deviations on the disk).

Regarding claims 14, 17, 18, and 22, a processor-readable medium comprising

processor-executable instructions corresponding is inherent to Hajjar. Otherwise these

claims are similar to claims 1, 4, 5, and 10, and are rejected for the same reasons.

Regarding claim 23, the processor-readable medium of Hajjar additionally

comprises instructions for creating a baseline signal, wherein the baseline signal is

different in different sectors of the disk (it is different wherever there is a surface

deviation, so even though Hajjar does not specifically measure sector-by-sector the

signal is inherently different in different sectors of the disk).

Regarding claims 25, 28, 29, and 31, they are method claims corresponding to

the earlier and are met when the system operates.

Regarding claims 35, 38, 39, and 43, they are similar to the earlier claims, and

are rejected for the same reasons.

6.   Claims 1, 4, 7, 9, 14, 17, 20, 21, 25, 28, 33, 34, 35, 38, 41, and 42 are rejected

under 35 U.S.C. 102(b) as being anticipated by Faucett (US 2002/0089906).

These rejections have been repeated from the previous Office Action:

Regarding claim 1, Faucett discloses a system for providing a signal to an

actuator within an optical disk drive, to focus optics on an optical disk within the optical

disk drive (paragraph 7), wherein the system comprises:

an error term generator configured to generate an error term (paragraph 15);

an adaptation coefficient configured to regulate a rate at which the error term

modifies an actuator control signal (there are several: for example term A in equation 3);

and

an actuator control signal generator to generate the actuator control signal,

wherein the actuator control signal is a function of a prior actuator position, the error

term and the adaptation coefficient (equation 3).

Regarding claim 4, in Faucett the error term generator is configured to calculate

the error term for every new actuator control signal generated by the actuator control

signal generator (obvious from equation 3).

Regarding claim 7, in Faucett the actuator control signal is configured to generate a signal according to Wk(new)=Wk(old)-Mu*Ek, wherein Ek is the error term and Mu is the adaptation coefficient (this is similar to Faucett's equation 3: Y(n) corresponds to Wk(new), Y(n-1) to Wk(old), Mu to A, and Ek to E(n); there are other components to Faucett's equation but the signal is still generated "according to" these parts).

Regarding claim 9, in Faucett the actuator control signal generator is configured, if an angular disk speed of the optical disk drive is sufficiently high, to shift a phase of terms within the actuator control signal to reduce actuator resonance (paragraph 28; the response time of the compensator can be improved – presumably necessary at a higher speed – but it shifts the phase of the actuator signal).

Regarding claims 14, 17, 20, 21, 25, 28, 33, 34, 35, 38, 41, and 42, they are similar to claims 1, 4, 7, and 9, and are rejected for the same reasons.

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8.   Claims 2, 3, 15, 16, 26, 27, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hajjar et al. (US 5,742,573) in view of Shoda et al. (US 5,477,333).

These rejections have been repeated from the previous Office Action:

Regarding claim 2, Hajjar discloses a system as discussed above.

Hajjar does not disclose "wherein the error term generator is configured to generate the error term using a FES signal as input."

Hajjar is trying to detect the surface height deviations of the disk (column 2, lines 10-11). Hajjar does so by focusing the lens and then detecting the lens position, which is parallel to the disk. However, directly detecting the surface height deviations would be more efficient.

Shoda discloses a method of detecting the distance between a lens and a measured surface (abstract). The method involves detecting a focus error signal "which represents a difference between a distance of the object lens from the measured surface" (abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hajjar as taught by Shoda to replace the focusing and lens position detecting steps of Hajjar with directly measuring the FES signal. The motivation would have been to simplify the measuring process, which would make it both more reliable and more efficient.

In Hajjar as modified by Shoda, the error term generator would be configured to generate the error term using a FES signal as input.

Regarding claim 3, Hajjar discloses sampling the position sensor signal and using an A-to-D converter to produce the error term (column 5, lines 29-37); in Hajjar in

view of Shoda, then, the error term generator is configured to sample the FES signal

and use an A-to-D converter to produce the error term.

Regarding claims 15 and 16, Hajjar in view of Shoda inherently includes a

processor-readable medium; all other elements of these claims have been discussed.

Regarding claims 26, 27, 36, and 37, they are similar to claims 2 and 3 and

rejected for the same reasons.

9.   Claims 6, 19, 30, and 40 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Hajjar (US 5,742,573).

These rejections have been repeated from the previous Office Action:

Regarding claim 6, as the terms in the claim have not been defined, it is difficult

to understand this claim (see 112 rejection above). However, as the examiner

understands the claim, the coefficients are the coefficients of a Fourier series

representation of the error signal, where the Mu term is the adaption coefficient from

claim 1 which regulates the rate at which the error term modifies an actuator control

signal.

Hajjar does not disclose these specific equations for the coefficients. However,

Hajjar does disclose creating the coefficients of a Fourier series representation (column

4, lines 37-56), and Hajjar discloses further refining the representation by averaging

coefficients with previous iteration coefficients (column 4, lines 37-56). Given that the

fundamental principles of Hajjar's Fourier series representation are the same, the

equations are simply mathematical details of the particular Fourier series and averaging

technique used, and it would have been obvious to one of ordinary skill in the art at the time of the invention to produce the coefficients as claimed.

Regarding claims 19, 30, and 40, they are similar to claim 6 and rejected for the same reasons.

10.   Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Faucett (US 2002/0089906) in view of Hajjar (US 5,742,573).

This rejection has been repeated from the previous Office Action:

Faucett discloses a system as discussed above.

Faucett does not disclose "wherein the actuator signal generator is configured, at disk rpm high enough to result in actuator resonance, to filter Ek values with a digital filter model of an inverse of the actuator frequency response before adapting each Wk."

Hajjar discloses filtering Ek values with a digital filter model of an inverse of the actuator frequency response before adapting each Wk (column 5, lines 32-37).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Faucett as taught by Hajjar to include filtering Ek values with a digital filter model of an inverse of the actuator frequency response before adapting each Wk.

The motivation would have been to avoid errors caused by the actuator frequency response.

11.   Claims 12-13, 24, 32, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hajjar et al. (US 5,742,573) in view of Kadlec et al. (US 6,813,226).

These rejections have been repeated from the previous Office Action:

Hajjar discloses a system as discussed above, including a baseline actuator positioning routine to establish a baseline signal for application to an actuator.

Hajjar does not disclose "wherein the baseline actuator positioning routine is configured to: step an actuator through a full range of focus; record a maximum value of the SUM signal data obtained within the full range of focus; and set the baseline signal according to an input to the actuator which resulted in close to the maximum value of the SUM signal data."

In fact, although Hajjar discloses that the lens focuses on the disk as part of the routine (column 2, lines 3-5), Hajjar does not disclose any details of the focusing system.

Kadlec discloses a focusing system including calculating a focus sum threshold (column 3, lines 28-42). The focus sum threshold is used to determine if a focus is acceptable (column 55, lines 35-49). Calculating a focus sum threshold comprises: stepping an actuator through a full range of focus (column 55, lines 15-24); recording a maximum value of the SUM signal data obtained with the full range of focus (column 55, lines 32-34); and setting the focal sum threshold close to the maximum value of the SUM signal data (column 55, lines 35-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hajjar to include the focusing system disclosed by Kadlec, including the step of calculating the focus sum threshold. The motivation would have been to

allow data to be reliably read from and written to the optical media, which Kadlec

system does (Kadlec, column 2, lines 46-49).

Since focusing is part of the baseline actuator positioning routine of Hajjar, Hajjar

in view of Kadlec includes wherein the baseline actuator positioning routine is

configured to: step an actuator through a full range of focus; record a maximum value of

the SUM signal data obtained within the full range of focus; and set the baseline signal

according to an input to the actuator which resulted in close to the maximum value of

the SUM signal data.

Regarding claim 13, in the teachings of Kadlec, the input to the actuator which

resulted in close to the maximum value of the Sum signal data is set to approximately

75% of the maximum value (this is within the acceptable range disclosed by Kadlec:

column 55, lines 35-49).

Regarding claim 24, Hajjar in view of Kadlec inherently includes a processor-

readable media comprising processor-executable instructions. Otherwise this claim is

similar to claim 12, and is rejected for the same reasons.

Regarding claim 32 and 44, they are similar to claim 12 and are rejected for the

same reasons.

Response to Arguments

12.   Applicant's arguments filed August 7th, 2006 have been fully considered but they

are not persuasive.

For ease of understanding, the explanation has been organized in the same manner as the Applicant's arguments.

Title Objection:

The Applicant has argued that the Examiner does not have the legal authority to object to the title. The Applicant is invited to read MPEP section 606.01 for the explanation of the Examiner's authority.

In particular, the Applicant's title is not specific enough to distinguish the invention from others in the art, as every optical disc drive apparatus is a focusing apparatus. "Optical disk drive focusing apparatus with feed forward signal," for example, would be more specific.

Claim Rejections – USC § 112:

The Examiner rejected claims 6-8, 19-21, 30, 33, and 40-42 under USC § 112, second paragraph because numerous terms used in the claimed equations are undefined. The Applicant has argued that the Examiner has not addressed whether the Applicant has defined the terms in question in the specification.

First, the Examiner respectfully points out that this response is incomplete. If the Applicant believes that the terms have been defined in the specification, it is the Applicant's duty to point out the relevant sections. The Applicant has not done so, and thus the Applicant's argument is not sufficient to overcome the rejection.

Second, the Examiner reviewed the specification before making the rejection,

and these terms have not been defined in such a way as to make their meaning clear in

the claim.

For example, take QS1 and QC2. They are described in paragraphs 36-39 of the

specification. There it says "Terms of the form QS1 or QC2 correspond to a value of the

sine or cosine of the first or second harmonic..." It goes on to say, "for example, QS1

might be sin(theta), while QC2 might be cos(2*theta)."

Already it is not clear what Applicant is attempting to claim: is the general case

where QS1 and QC2 take sinusoidal form being claimed, or is the specific example

where QS1 is sin(theta) and QC2 is cos(2*theta) being claimed?

Besides these examples, the Examiner considers the terms A0, A1, A2, B1, B2,

DC), QS2, QC1, and Wk similarly unclear.

Third, regardless of whether or not the terms are defined in the specification, this

claim would still be rejected under USC § 112, second paragraph, as indefinite because

it is incomplete. The undefined terms are not linguistic terms that can be easily

referenced elsewhere in the specification: they are mathematical terms used in a

mathematical equation, and the equation is not complete without their definition. Thus

the claim is omitting essential structural elements necessary to understand it: this

makes it indefinite.

To use an analogy, the Applicant has performed the mathematical equivalent of

writing half a sentence. An equation is not complete without a definition of every term in

the equation.

Claim Rejections – 35 USC § 102 Rejections Over Hajjar:

Applicant argues that Hajjar does not teach an adaption coefficient configured to regulate a rate at which the error term modifies an actuator control signal.

Hajjar does teach such a coefficient – or, rather, it is an inherent part of the method Hajjar discloses.

Hajjar measures an error term (the runout). Hajjar uses a Fourier series to represent the error term. The Fourier series is used to generate a feedforward, or actuator control signal.

In column 4, lines 40-60, Hajjar discloses that the Fourier series components are averaged with previous iteration Fourier series components in order to refine the feedforward signal.

Since the Fourier series is a representation of the error term, this means that an entire error term is not applied to the actuator control signal right away. Instead, it is averaged with previous error terms. This averaging process regulates the rate at which the error term modifies the actuator control signal: if it weren't done, the entire error term would modify it right away, but instead, it is phased in by the averaging process.

Hajjar does not specifically disclose an adaption coefficient, but it is inherent: even if Hajjar just performs a simple average of the current and previous error terms, the adaption coefficient for each term in the Fourier series would then be ½.

Claim Rejections – 35 USC § 102 Rejections Over Faucett:

Applicant argues that the coefficient A in Faucett's equation 3, cited by Examiner, is not an adaption coefficient configured to regulate a rate at which the error term modifies an actuator control signal. Applicant quotes paragraph 21 of Faucett and concludes that coefficient A is used to generate a sinusoidal waveform, not to regulate the rate at which the error term modifies an actuator control signal.

Applicant is partially right. Coefficient A is used by Faucett to make a sinusoidal waveform. However, besides that function, coefficient A also regulates the rate at which the error term modifies the actuator control signal.

This is apparent from equation 2 of Faucett:

$$Y(n)=A \cdot E(n) + B \cdot E(n-1), \quad n=0,1,2,....$$

In this equation, as described in paragraph 21 (the same paragraph cited by Applicant), $Y(n)$ is the output signal from the controller, $E(n)$ is the current error signal, and $E(n-1)$ is the previous error signal.

Thus A modifies the amount that the current error signal contributes to the current controller signal. B does the same for the previous signal. The relationship between A and B determines the relative contribution of both the current and previous signals. If A is higher, the current error signal contributes more, and if it is lower, the current error signal contributes less – or, to put it another way, if A is higher, the error signal makes a higher immediate contributes, whereas if A is lower, the error signal does not make an immediate contribution (but may contribute later through B).

Therefore A is a coefficient which regulates the rate at which the error term modifies the actuator control signal.

Claim Rejections -- 35 USC § 103:

For those claims which were rejected under 35 USC § 103, Applicant has argued only that their dependence on allowable claims makes them allowable. Since no claims have been found allowable, this argument is not persuasive.

Conclusion

13.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher R. Lamb whose telephone number is (572)

272-5264. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (571) 272-7589. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CRL 9/19/06

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